

## REMARKS

Applicants appreciate the very detailed examination evidenced by the Official Action mailed April 7, 2005 (hereinafter the Official Action). Applicants also appreciate the indication that Claims 11, 13 – 14, 18, and 20 – 21 include patentable subject matter and would be allowable if rewritten as suggested by the Examiner. *Official Action page 12.*

As described herein below in greater detail, Applicants have amended the independent claims to further clarify the patentable subject matter recited therein. For example, independent Claim 1 has been amended to recite in-part: "**calculating pixel data values at points where a line that passes through the interpolation location and extending in the direction of interpolation intersects horizontal or vertical lines of the display.**" The other independent Claims have been similarly amended. Applicants respectfully submit that the cited references do not disclose or suggest at least the above-highlighted recitations of the independent claims for at least the reasons described herein.

### **The title has been amended as suggested by the Examiner.**

The title of the application has been amended to recite "Generating Interpolated Display Data Using Remote Pixel Data" as suggested by the Examiner. Accordingly, the objection to the title has been obviated by amendment.

### **The claims have been amended to address some of the rejections under § 112.**

Claims 3 and 24 stand rejected under 35 U.S.C. § 112 2<sup>nd</sup> paragraph over the recitation of "the term about" therein. *Official Action, page 3.* In response, Applicants have removed the recitation of "about" from Claims 3 and 24. Accordingly, the rejection of Claims 3 and 24 under § 112 has been overcome by amendment and are respectfully requested to be withdrawn.

Regarding the rejection of Claims 5 – 6, 8 – 21, and 26 – 27, Applicants maintain that the term "Lagrangian" is supported by the specification as filed. In particular, Claims 5 – 6, 8 – 21, and 26 – 27 stand rejected under 35 U.S.C. § 112, 1<sup>st</sup> paragraph, wherein the Official Action alleges that the term Lagrangian is not enabled by the

disclosure. *Official Action*, page 2. In response, Applicants respectfully direct the Examiner's attention, for example, to page 13 of the Application which reads in part:

Referring to FIG. 4, the directional interpolator unit 123 calculates pixel data Q1 through Q4 of the respective intersections on horizontal pixel lines intersecting an extended line extending in a direction of interpolation of an interpolation location LP from the interpolation location LP, using a Lagrangian or polyphase filter which perform Lagrangian or polyphase filtering such as in equations 6 and 7. **The directional interpolator 123 applies Lagrangian or polyphase filtering to the calculated pixel data Q1 through Q4 on the extended line once more, and obtains and outputs interpolation data (R', G', or B' data) of the interpolation location LP. Lagrangian or polyphase filtering obtains interpolation data by using an n-th degree polynomial that passes through the n+1 points x(i) for i=0, ..., n.**

$$L_i(t) = \prod_{k=0, k \neq i}^n \frac{t-k}{i-k} \quad (6)$$

(Here, n is the number of pixels to be used for interpolation and t is a distance from a first pixel of the n pixels to the intersection location).

$$p_n(t) = \sum_{i=0}^n L_i(i)x(i) \quad (7)$$

(Here, x(i) is pixel data at the respective intersections).

**For example, in FIG. 4, data Q1 is obtained by applying Lagrangian or polyphase filtering to data A1 through A4.** At this time, since four pixel data A1 through A4 exist corresponding to four points, n=4 and t represents the distance from the point A1 to the point Q1 is about 1.2. Likewise, pixel data Q2 through Q4 at each of the remaining intersections of the horizontal pixel lines and the extended line are calculated. Interpolation data (R', G', or B' data) at the interpolation location LP is calculated by applying Lagrangian or polyphase filtering to the pixel data Q1 through Q4.

*Application*, page 13, lines 8 – 31 and page 14, lines 1-2 (*emphasis added*).

As demonstrated by the above exemplary sections of the Application, there is a detailed discussion of Lagrangian and polyphase filtering including at least two equations that can be used to implement these types of filtering. Accordingly, Applicants

respectfully submit that the application as filed does support the recitation of the term "Lagrangian" in accordance with section 112.

The Official Action also appears to have reject the above recited claims on the basis of the recitation of "or". *Official Action, page 2*. Applicants are unsure of the basis of the rejection based on the term "or", particularly in view of the fact that the Official Action goes on to discuss the use of the term Lagrangian as outlined above. Accordingly, Applicants respectfully request clarification of the rejection provided in paragraph 5 under the heading of claim objections.

**The independent claims are patentable over Greggain and Shimizu.**

Claims 1 – 3 and 22 – 24 stand rejected under 35 U.S.C. § 103 over U.S. Patent No. 6,219,464 to Greggain ("Greggain"). *Official Action, page 5*. In response, Applicant has amended independent Claim 1 to recite in part:

determining a pixel value at an interpolation location of a display based on filtering pixel data proximate to the interpolation location in a plurality of directions from the interpolation location, wherein determining a pixel value comprises:

low-pass filtering the data proximate to the interpolation location to determine a direction of interpolation for the interpolation location;

**calculating pixel data values at points where a line that passes through the interpolation location and extending in the direction of interpolation intersects horizontal or vertical lines of the display; and**

filtering the pixel data values at the points to provide an interpolated pixel value at the location of interpolation.

Independent Claims 8, 9, 15, 16, and 22 have been amended to include similar recitations. Applicants respectfully submit that Greggain do not disclose or suggest at least:

calculating pixel data values at points where a line that passes through the interpolation location and extending in the direction of interpolation intersects horizontal or vertical lines of the display.

As understood by Applicants, Greggain interpolates pixel values along a line that intersects pixel values of the source data. For example, as shown in Figure 5 of

Greggain, the direction of interpolation is shown by the solid oblique lines. Furthermore, Greggain discusses interpolating the values  $V_0$ ,  $V_1$  and  $V_2$  each of which lie along the solid oblique lines that pass through pixel data included in the original source data to be scaled up. Once the values  $V_0$ ,  $V_1$ , and  $V_2$  have been interpolated, the value of the pixel  $W$  is calculated by interpolating between the interpolated pixel values  $V_0$ ,  $V_1$ , and  $V_2$ . Similar types of operations can be observed in Figure 6 of Greggain wherein reverse oblique solid lines are shown. As understood by Applicants, the operations discussed in conjunction with Figure 6 in Greggain are analogous to those discussed above in reference to Figure 5.

In contrast to the discussion in Greggain, the amended independent claims recite in part: calculating pixel data values at points where a line that passes through the interpolation location and extending in the direction of interpolation intersects horizontal and vertical lines of the display. In other words, in some embodiments according to the invention, as shown for example in Figure 4 of the present application, the line which extends through the interpolation location extends in the direction of interpolation and intersects horizontal lines of the display at points  $Q_1 - Q_4$ . Accordingly, these points  $Q_1 - Q_4$  are on the line that extends through the interpolation location are calculated as discussed above in reference to page 13 of the application. Therefore, in contrast to the discussion in Greggain, the present claims recite calculating pixel data values at points that lie on a line that passes through the interpolation point and intersects lines on the display, which is not disclosed or suggested by Greggain. Applicants further submit that Shimizu also does not disclose or suggest these recitations.

In addition to the reasons described above, Applicants further submit that independent Claims 8, 9, 15, and 16 also include the recitation of "using Lagrangian or polyphase filtering". As apparently admitted in the Official Action, "the use of Lagrangian polynomials for this kind of application "is actually very, very rare." *Official Action, page 3*. Applicants respectfully submit that in view of the apparent admission in the Official Action that the use of Lagrangian polynomials is very, very rare in this type of application supports Applicants contention that Claims 8, 9, 15 and 16 are patentable over Greggarian and Shimizu. Accordingly, Applicants respectfully submit that these independent claims are further patentable for at least these additional reasons.

Accordingly, Applicants respectfully submit that independent Claims 1, 8, 9, 15, 16 and 22 are patentable over Greggain and Shimizu for at least the above reasons. Furthermore, the dependent claims which depend from each of the above cited independent claims are also patentable at least per the patentability of the independent claims from which the dependent claims depend.

### CONCLUSION

Applicants have amended the independent claims to further clarify the patentable subject matter recited therein. Furthermore, Applicants have shown that the recitations of the amended claims are not disclosed or suggested by the cited references. Accordingly, Applicants respectfully request the withdrawal of all rejections and the allowance of all claims in due course. If any informal matters arise, the Examiner is encouraged to contact the undersigned by telephone.

Respectfully submitted,

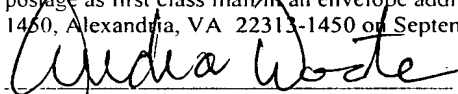


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